

## Complete Summary

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### GUIDELINE TITLE

Primary prevention of hypertension. Clinical and public health advisory from the National High Blood Pressure Education Program.

### BIBLIOGRAPHIC SOURCE(S)

Whelton PK, He J, Appel LJ, Cutler JA, Havas S, Kotchen TA, Roccella EJ, Stout R, Vallbona C, Winston MC, Karimbakas J. Primary prevention of hypertension: clinical and public health advisory from The National High Blood Pressure Education Program. JAMA 2002 Oct 16; 288(15):1882-8. [45 references] [PubMed](#)

### GUIDELINE STATUS

This is the current release of the guideline.

It updates a previously issued version: Bethesda (MD): U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung and Blood Institute; 1993 Sep. 180 p.

## COMPLETE SUMMARY CONTENT

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## SCOPE

### DISEASE/CONDITION(S)

Hypertension

### GUIDELINE CATEGORY

Evaluation  
Prevention

### CLINICAL SPECIALTY

Family Practice  
Internal Medicine  
Pediatrics  
Preventive Medicine

#### INTENDED USERS

Advanced Practice Nurses  
Dietitians  
Nurses  
Physician Assistants  
Physicians  
Public Health Departments

#### GUIDELINE OBJECTIVE(S)

- To update the 1993 National High Blood Pressure Education Program Working Group Report on Primary Prevention of Hypertension
- To address the public health challenges of hypertension described in the Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure

#### TARGET POPULATION

Population-based Approach: Children and adults living in the U.S.

Targeted Intervention Approach: Children and adults living in the U.S. at high risk for hypertension including those with high normal blood pressure, a family history of hypertension, African American (black) ancestry, overweight or obesity, a sedentary lifestyle, excess intake of dietary sodium, insufficient intake of potassium, or excess consumption of alcohol.

#### INTERVENTIONS AND PRACTICES CONSIDERED

1. Lifestyle modifications with proven efficacy including weight loss, dietary sodium reduction, increased physical activity, moderation of alcohol consumption, potassium supplementation, and modification of whole diets
2. Interventions with uncertain or less proven efficacy include calcium supplementation, fish oil supplementation, and herbal or botanical dietary supplements

#### MAJOR OUTCOMES CONSIDERED

Efficacy of interventions, as measured by:

- Incidence of hypertension
- Blood pressure measurements (systolic and diastolic)
- Percentage of mortality from cardiovascular disease, stroke, coronary heart disease and other causes associated with hypertension

## METHODOLOGY

### METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

### DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

National Heart, Lung, and Blood Institute (NHLBI) staff conducted a MEDLINE search of the English-language, peer-reviewed scientific literature from 1993 through 2001 using key Medical Subject Headings (MeSH) terms hypertension, blood pressure, primary prevention, exercise, weight loss, alcohol drinking, diet sodium-restricted, dietary potassium, and diet.

### NUMBER OF SOURCE DOCUMENTS

Not stated

### METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus (Committee)

### RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

### METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses  
Systematic Review

### DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not applicable

### METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

### DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The co-chairs reviewed the MEDLINE search results, identified new areas to be addressed, and, with the assistance of the National Heart, Lung, and Blood Pressure Institute (NHLBI) staff, developed an outline and subsequently assembled a working draft of the document. The draft document was distributed to the members of the working groups for additions and modifications. Thereafter, the additions and modifications were tabulated and discussed via teleconferencing and electronic mail. This process continued among members of the working

group, the NHLBI staff, and co-chairs in a reiterative fashion. The co-chairs adjudicated differences of opinions. The assembled document was mailed to the working group members for their final comments. The co-chairs then revised the document and forwarded it to the entire Coordinating Committee for review and comments.

#### RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

#### COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

#### METHOD OF GUIDELINE VALIDATION

Peer Review

#### DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The document was forwarded to the entire Coordinating Committee for review and comment. A working group member presented the report to the entire National High Blood Pressure Education Program (NHBPEP) Coordinating Committee at its February 2002 meeting, and they provided oral and written comments to be included in the document. Two meetings of NHLBI staff and the co-chairs were held to address and incorporate the Coordinating Committee comments. Thereafter, the penultimate draft of the report was prepared and sent to the Coordinating Committee who unanimously voted to approve it.

### RECOMMENDATIONS

#### MAJOR RECOMMENDATIONS

##### Approaches to Primary Prevention of Hypertension

Hypertension can be prevented by complementary application of strategies that target the general population and individuals and groups at higher risk for high blood pressure. Lifestyle interventions are more likely to be successful, and the absolute reductions in risk of hypertension are likely to be greater when targeted in persons who are older and those who have a higher risk of developing hypertension compared with their counterparts who are younger or have a lower risk. However, prevention strategies applied early in life provide the greatest long-term potential for avoiding the precursors that lead to hypertension and elevated blood pressure levels and for reducing the overall burden of blood pressure-related complications in the community.

##### Population Based Strategy

A population-based approach aimed at achieving a downward shift in the distribution of blood pressure in the general population is an important component for any comprehensive plan to prevent hypertension. A small decrement in the distribution of systolic blood pressure is likely to result in a substantial reduction in the burden of blood pressure–related illness. Public health approaches, such as lowering sodium content or caloric density in the food supply, and providing attractive, safe, and convenient opportunities for exercise are ideal population-based approaches for reduction of average blood pressure in the community. Enhancing access to appropriate facilities (parks, walking trails, bike paths) and to effective behavior change models is a useful strategy for increasing physical activity in the general population.

### Intensive Targeted Strategy

More intensive targeted approaches, aimed at achieving a greater reduction in blood pressure in those who are most likely to develop hypertension, complement the previously mentioned population-based strategies for prevention of hypertension. Groups at high risk for hypertension include those with high normal blood pressure, a family history of hypertension, African American (black) ancestry, overweight or obesity, a sedentary lifestyle, excess intake of dietary sodium, insufficient intake of potassium, or excess consumption of alcohol. Contexts in which intensive targeted interventions can be conducted to prevent hypertension in African Americans and older Americans include health care settings as well as senior centers and faith-based organizations that have blood pressure screening and referral programs.

### Interventions With Documented Efficacy

The 1993 recommendations included weight loss, reduced intake of dietary sodium, moderation in alcohol consumption, and increased physical activity as the best proven interventions for prevention of hypertension. Since then, further evidence in support of these recommendations has emerged (see the "Potential Benefits" field). In addition, potassium supplementation and modification of eating patterns has been shown to be beneficial in prevention of hypertension. Brief descriptions of the 6 recommended lifestyles with proven efficacy for prevention of hypertension follow:

1. Maintain normal body weight for adults (body mass index, 18.5 - 24.9 kg/m<sup>2</sup>)
2. Reduce dietary sodium intake to no more than 100 mmol/d (approximately 6 g of sodium chloride or 2.4 g of sodium per day)
3. Engage in regular aerobic physical activity such as brisk walking (at least 30 minutes per day, most days of the week)
4. Limit alcohol consumption to no more than 1 oz (30 ml) of ethanol (e.g., 24 oz [720 mL] of beer, 10 oz [300 mL] of wine, or 2 oz [160 mL] of 100-proof whiskey) per day in most men and to no more than 0.5 oz (15 mL) of ethanol per day in women and lighter-weight persons
5. Maintain adequate intake of dietary potassium (> 90 mmol [3500 mg] per day)
6. Consume a diet that is rich in fruits and vegetables and in low-fat dairy products with a reduced content of saturated and total fat (Dietary Approaches to Stop Hypertension [DASH] eating plan)

## Interventions With Uncertain or Less Proven Efficacy

**Calcium Supplementation.** Consistent with previous observations, a recent meta-analysis of randomized controlled clinical trials suggests that calcium supplementation results in only a small reduction in blood pressure. This effect has only been observed in those with hypertension. However, for general health, it is prudent to recommend adequate calcium intake as a component of any diet (1000-1200 mg/d for adults).

**Fish Oil Supplementation.** Two meta-analyses of clinical trials indicate that supplementation with relatively high doses of omega-3 polyunsaturated fatty acids lowers blood pressure in hypertensive patients, especially in those with untreated hypertension. In normotensive persons, however, the effect seems to be small. Although evidence for a blood pressure–lowering effect of fish oil is modest, observational epidemiological studies and clinical trials have suggested that an increased intake of fish oil may reduce the risk of coronary heart disease and stroke.

**Herbal or Botanical Dietary Supplements.** There has been considerable increase in the use of herbal products in the United States. Few clinical trial reports are available to support the use of herbal and botanical supplements in the prevention or treatment of high blood pressure or heart disease. At a minimum, health care professionals should ask their patients about the use of herbal products and consider the possibility of herb-drug interactions.

## Primary Prevention in Children

There is ample evidence that hypertension begins in childhood. Children with higher than average blood pressure levels early in life are more likely to develop hypertension later in life. Efforts to prevent blood pressure levels from increasing in childhood are prudent and best accomplished by application of the same lifestyle approaches used to prevent and treat hypertension in adults.

Accordingly, school administrators are encouraged to examine their lunch menus and promote the use of heart-healthy foods. Parents are encouraged to read food labels and make wise choices for lunches prepared at home. In addition, school curricula should include health education programs that promote increased physical activity and other healthy lifestyles aimed at prevention of cardiovascular and other chronic diseases

## CLINICAL ALGORITHM(S)

None provided

## EVIDENCE SUPPORTING THE RECOMMENDATIONS

### TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations were based primarily on a comprehensive review of published reports. To provide information on the evidence category for articles

used to prepare the guideline, the following symbols are appended to the citations in the reference list in the original guideline document:

#### Scheme Used for Classification of the Evidence

M Meta-analysis; use of statistical methods to combine the results from clinical trials

Ra Randomized controlled trials; also known as experimental studies

Re Retrospective analyses; also known as case-control studies

F Prospective study; also known as cohort studies, including historical or prospective follow-up studies

X Cross-sectional survey; also known as prevalence studies

Pr Previous review or position statements

C Clinical interventions (nonrandomized)

## BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

### POTENTIAL BENEFITS

- Primary prevention of hypertension provides an opportunity to interrupt and prevent the continuing costly cycle of managing hypertension and its complications. Prevention strategies applied early in life provide the greatest long-term potential for avoiding the precursors that lead to hypertension and elevated blood pressure levels and for reducing the overall burden of blood pressure-related complications in the community.
- Decreased morbidity associated with hypertension: In an analysis based on Framingham Heart Study experience, it was reported that a 2-mm Hg reduction in the population average of diastolic blood pressure for white US residents 35 to 64 years of age would result in a 17% decrease in the prevalence of hypertension, a 14% reduction in the risk of stroke and transient ischemic attacks, and a 6% reduction in the risk of coronary heart disease.
- Decreased mortality associated with hypertension: A report of large cohort studies conducted in 366,559 young and middle-aged men and women indicated that persons with a low cardiovascular disease-risk profile (serum cholesterol level <200 mg/dL [5.18 mmol/L], blood pressure 120/80 mm Hg, and no current cigarette smoking) have a 72% to 85% lower mortality from cardiovascular disease and a 40% to 58% lower mortality from all causes compared with persons who have 1 or more of 3 modifiable cardiovascular risk factors. The estimated greater life expectancy for the low-risk group ranged from 5.8 to 9.5 years.

### POTENTIAL HARMS

Adverse effects from the use of fish oil supplements, including eructation and a fishy taste, have been reported in some studies. These effects were more common in those assigned to fish oil capsules than in their controls.

## IMPLEMENTATION OF THE GUIDELINE

### DESCRIPTION OF IMPLEMENTATION STRATEGY

#### Population Based Strategy

Public health approaches, such as lowering sodium content or caloric density in the food supply, and providing attractive, safe, and convenient opportunities for exercise are ideal population-based approaches for reduction of average blood pressure in the community. Enhancing access to appropriate facilities (parks, walking trails, bike paths) and to effective behavior change models is a useful strategy for increasing physical activity in the general population.

#### Intensive Targeted Strategy

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#### Primary Prevention for Children

School administrators are encouraged to examine their lunch menus and promote the use of heart-healthy foods. Parents are encouraged to read food labels and make wise choices for lunches prepared at home. In addition, school curricula should include health education programs that promote increased physical activity and other healthy lifestyles aimed at prevention of cardiovascular and other chronic diseases.

#### Barriers to Improvement

Cultural norms, insufficient attention to health education and lack of referral to registered dietitians, economic disincentives to healthier lifestyles, lack of reimbursement for hypertension prevention counseling services by third-party payers, and other barriers to prevention of hypertension continue to impede progress. For example, economic disincentives to healthier lifestyles include higher prices for low-sodium products and lower unit pricing for larger portions. To overcome this barrier, professional associations and policy developers should work with the food industry to increase availability of lower-sodium food products and to provide educational programs for consumers regarding portion size and



heart-healthy food choices. In addition, insufficient attention to health education, including nutrition education, by health care providers, school systems, and public health and voluntary associations is an impediment to progress.

## IMPLEMENTATION TOOLS

### Patient Resources

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

## INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

### IOM CARE NEED

Staying Healthy

### IOM DOMAIN

Effectiveness  
Patient-centeredness

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

Whelton PK, He J, Appel LJ, Cutler JA, Havas S, Kotchen TA, Roccella EJ, Stout R, Vallbona C, Winston MC, Karimbakas J. Primary prevention of hypertension: clinical and public health advisory from The National High Blood Pressure Education Program. JAMA 2002 Oct 16;288(15):1882-8. [45 references] [PubMed](#)

### ADAPTATION

Not applicable: The guideline was not adapted from another source.

### DATE RELEASED

1993 (revised 2002 Oct 16)

### GUIDELINE DEVELOPER(S)

National Heart, Lung, and Blood Institute (U.S.) - Federal Government Agency [U.S.]

### SOURCE(S) OF FUNDING

National Heart, Lung, and Blood Institute (NHLBI)

## GUIDELINE COMMITTEE

National High Blood Pressure Education Program Coordinating Committee

## COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

The National High Blood Pressure Education Program (NHBPEP) Coordinating Committee consists of representatives from 38 national professional, public, and voluntary health organizations, and 7 federal agencies.

Names of Working Group Members: Paul K. Whelton, MD, MSc; Jiang He, MD, PhD; Lawrence J. Appel, MD, MPH; Jeffrey A. Cutler, MD, MPH; Stephen Havas, MD, MPH, MS; Theodore A. Kotchen, MD; Edward J. Roccella, PhD, MPH; Ron Stout, MD, MPH; Carlos Vallbona, MD; Mary C. Winston, EdD, RD; Joanne Karimbakas, MS, RD

## FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

The authors and Coordinating Committee representatives served as volunteers without remuneration.

## GUIDELINE STATUS

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## GUIDELINE AVAILABILITY

Electronic copies: Available from the [Journal of the American Medical Association \(JAMA\) Online](#).

Print copies: Available from NHLBI Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; e-mail: [nhlbiic@dgsys.com](mailto:nhlbiic@dgsys.com)

## AVAILABILITY OF COMPANION DOCUMENTS

None available

## PATIENT RESOURCES

The following is available:

- Facts about lowering your blood pressure. Bethesda (MD): U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung and Blood Institute (NHLBI), 2000 May. 16 p. (NIH Publication No. 00-3281). Electronic copies available from the [National Institutes of Health, National Heart, Lung and Blood Institute Web site](#).

Print copies: Available from NHLBI Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; e-mail: [nhlbiic@dgsys.com](mailto:nhlbiic@dgsys.com)

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